

Claims

[1] A conductive thermoplastic-resin film which comprises a mixture of a thermoplastic resin and a conductive material and has a volume resistivity, as measured by the four-probe method in accordance with JIS K-7194, of $10 \Omega \cdot \text{cm}$ or lower and a moisture permeability, as measured at a film thickness of $100 \mu\text{m}$ by JIS K-7129 method B in an atmosphere of 40°C and a relative humidity (RH) of 90%, of $10 \text{ g}/(\text{m}^2 \cdot 24 \text{ hr})$ or lower.

[2] The conductive thermoplastic-resin film according to claim 1, wherein the conductive material contained in the conductive thermoplastic-resin film A comprises: a graphite powder which has an average particle diameter of from $1 \mu\text{m}$ to $20 \mu\text{m}$ and in which particles having a particle diameter of $40 \mu\text{m}$ or smaller account for 80% by mass or more of the whole powder; and a carbon black powder.

[3] The conductive thermoplastic-resin film according to claim 1 or 2, wherein the volume filling factor A of the carbon black powder and the volume filling factor B of the graphite powder in the conductive material contained in the conductive thermoplastic-resin film A are in the ranges represented by the following expressions:

$$0 < A \leq 0.4 \times (1-B)$$

$$0 < B \leq 0.5$$

$$A + B = 1$$

[4] A conductive thermoplastic-resin film which comprises a mixture of a thermoplastic resin and a conductive material and has a volume resistivity, as measured by the four-probe method in accordance with JIS K-7194, of $10 \Omega \cdot \text{cm}$ or lower and a peel strength in the range of 1-150 N as measured at 25°C after disposing two sheets of the film (150 mm \times 25 mm) so as to face each other and laminating the sheets to each other by pressing these in an atmosphere of 25°C at a pressure of $3.9 \times 10^5 \text{ Pa}$ for 1 minute.

[5] The conductive thermoplastic-resin film according to claim 4, wherein that the conductive thermoplastic-resin film B contains an amorphous propylene/butene copolymer or an amorphous propylene/ethylene/butene copolymer in an amount in the range of 30-65% by mass.

[6] A conductive thermoplastic-resin laminate film which comprises: a conductive thermoplastic-resin film A, as a base, which comprises a mixture of a thermoplastic resin and a conductive material and having a volume resistivity, as measured by the four-probe method in accordance with JIS K-7194, of $10 \Omega \cdot \text{cm}$

or lower and a moisture permeability, as measured at a film thickness of 100 μm by JIS K-7129 method B in an atmosphere of 40°C and a relative humidity (RH) of 90%, of 10 $\text{g}/(\text{m}^2 \cdot 24 \text{ hr})$ or lower; and a conductive thermoplastic-resin film B having the following tackiness characteristics which has been laminated to at least one side of the film base:

Tackiness characteristics:

the peel strength as measured at 25°C after disposing two sheets of the film (150 mm \times 25 mm) so as to face each other and laminating the sheets to each other by pressing these in an atmosphere of 25°C at a pressure of $3.9 \times 10^5 \text{ Pa}$ for 1 minute is in the range of 1-150 N.

[7] The conductive thermoplastic-resin film or conductive thermoplastic-resin laminate film according to any one of claims 1 to 6, characterized by being used as a current collector for an electric double-layer capacitor and as a current collector for a proton-ion polymer battery.